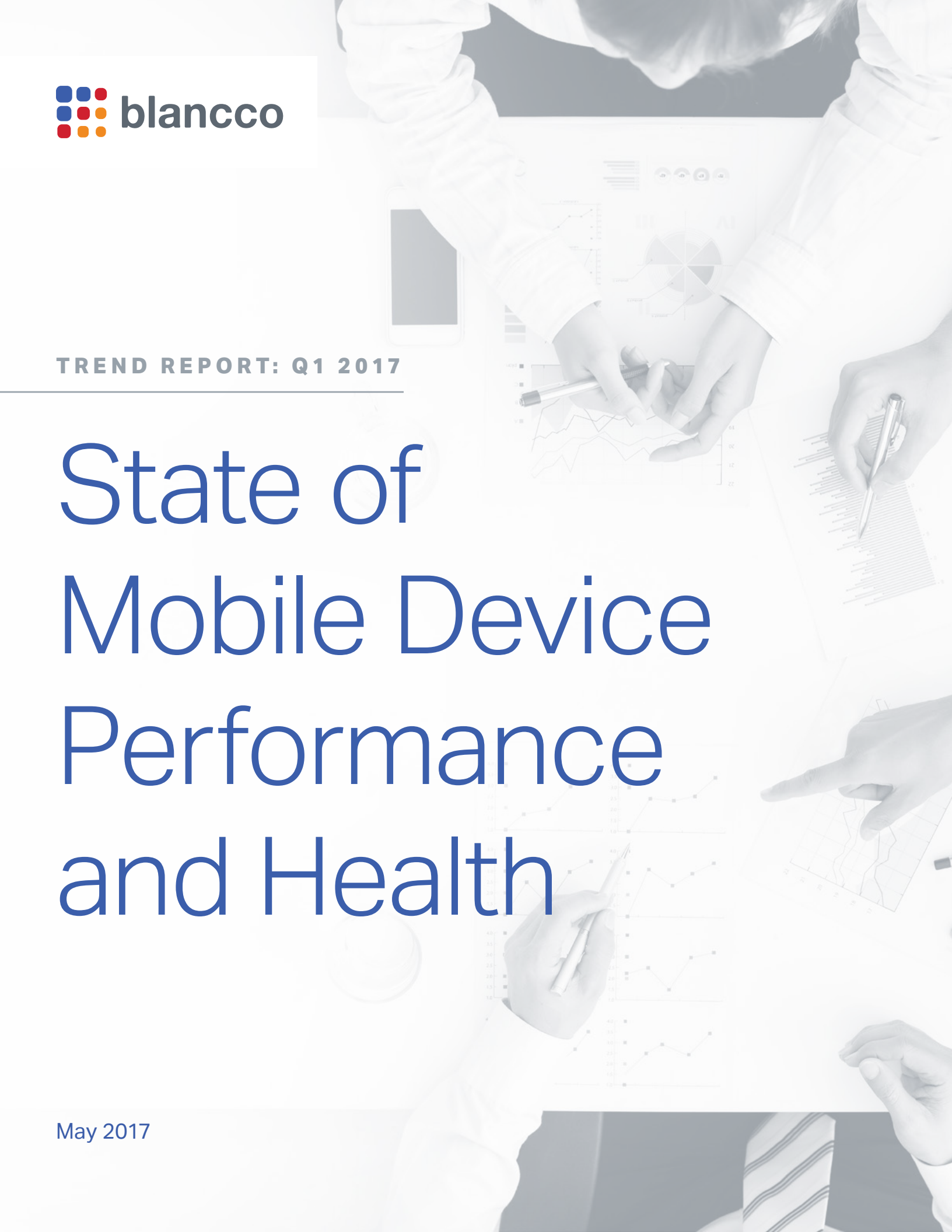

blancco

TREND REPORT: Q1 2017

State of Mobile Device Performance and Health

May 2017

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Introduction

Mobile devices have certainly come a long way since the iPhone was first released in 2007, when only 6 percent of the population had smartphones. In July 2016, smartphone adoption surpassed 80 percent of all mobile phone owners. That rate then increased to 81 percent in December 2016. Now in the first quarter of 2017, a total of 347.4 million smartphones were shipped worldwide, according to the International Data Corporation (IDC) Worldwide Quarterly Mobile Phone Tracker.

With mobile device adoption showing no signs of slowing down, mobile network operators/carriers and device manufacturers are poised to drive significant sales and revenue. For businesses encouraging a mobile-first workforce, mobile devices have become a vital asset in improving employee productivity and performance.

Over the last several years, Apple's iOS and Android have captured the lion's share of market share away from other operating systems. But as smartphone adoption grows, so does users' reliance on mobile devices grow. But the growth of the mobile market could be hampered by sluggish and lagging device performance.

But for every mobile user – be it a consumer or a corporation – lagging and sluggish performance is one factor that can prevent devices from taking full advantage of their power. In this report, we will share various data points that indicate key sources of device performance issues.

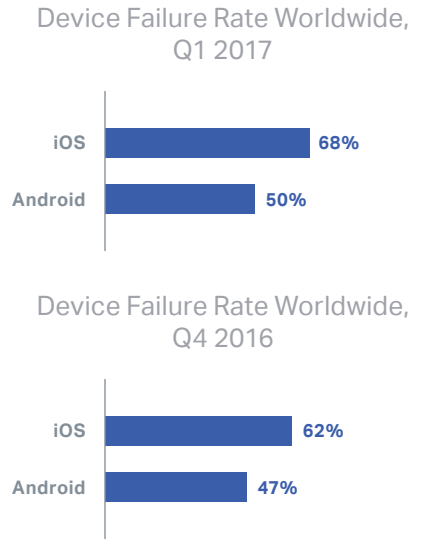
About the Data Powering the Report

The State of Mobile Device Performance and Health report is an in-depth quarterly review of global mobile device trends, including: diagnostics testing, performance issues and failures. The information contained in this report is based on internal data collected from millions of iOS and Android mobile devices that were brought into mobile carriers and device manufacturers for diagnostics testing in North America, Europe and Asia during the first quarter of 2017 (Q1 2017).

The diagnostics tests were performed using the Blancco Mobile Diagnostics platform, the global leader in mobile device diagnostics and business intelligence. Organizations of all types can leverage this information to ensure a better customer experience and improve device performance. The report's findings are based on aggregate, anonymized data and include the following information:

- Device failure rates by operating systems, manufacturers and models
- The most common types of performance issues – hardware, software and connectivity – by operating systems and geographic regions
- The top 10 iOS and Android apps with the highest crashing rates

Figure 1.



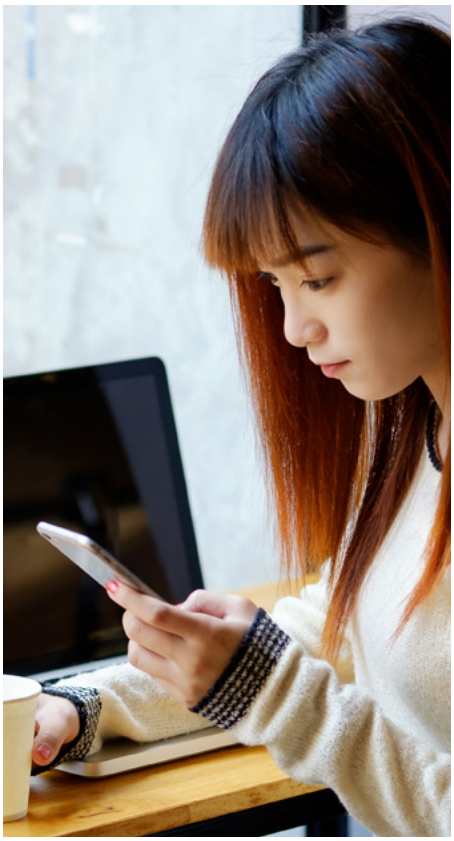
Note: Failure rate refers to devices that had excessive performance issues that could not be resolved.

Android Tightens Grip on its Dominant Position Over Apple in Smartphone Performance Battle

Continuing on the trend we've been seeing in our quarterly trend reports, our data once again suggests that Android devices are holding on tight to their dominant position over Apple in the smartphone performance battle. In the first quarter of 2017, the overall failure rate of Android devices was significantly lower (50 percent) than iOS devices (68 percent). This is a slight increase from the previous quarter (Q4 2016), when the Android failure rate was 47 percent. Despite this quarter-over-quarter increase, Android devices are still performing considerably better than their iOS counterparts. Meanwhile, the iOS failure rate has similarly increased from 62 percent in Q4 2016 to 68 percent in Q1 2017.

There are many differences between Android and iOS. From a hardware perspective, Android devices were first to capitalize on the bigger screen. But Apple was the first to market with its voice assistant, Siri. Additionally, Android lets users decide which app is the default for opening web links, while iPhones don't allow users to do this.

Another key difference between the two operating systems is in how each handles external storage. Some Android phones have an SD card slot. Android lets people use external storage from an SD card inserted into the phone, a USB card reader, a USB-powered storage device (i.e. thumb drive or hard drive) and network mounted storage as part of the file system. This means Android users can plug various types of storage devices to their mobile phone, or connect to a service. Although iOS can connect to external cameras for photo transfers, it's only a one-way connection and only supports certain devices.



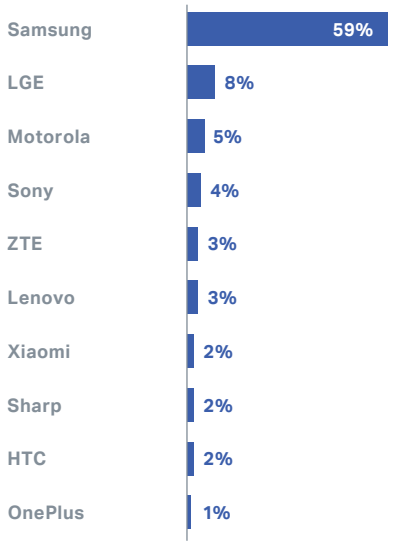
In the official press release announcing Samsung's Q1 2017 financial results, the Android manufacturer stated, "Against this backdrop, the company will strive to maintain profitability through robust sales of the Galaxy S8 and S8+ and the launch of a new flagship smartphone in the second half." Media reports have speculated that this 'new flagship smartphone' could be the Galaxy Note 8 that's expected to launch later this year. Another important detail revealed in its Q1 2017 financial results is that pre-orders for its Galaxy S8 smartphone, which launched in April, were better than many analysts had expected, giving the tech giant hope that the new phone will alleviate some of the problems it faced with the exploding Galaxy Note 7 phones last year, which have since been recalled.

Comparing the Galaxy S8, which launched in April 2017, to the iPhone 7, the screen size on the Galaxy S8 is 1.1 inches larger than the iPhone 7 and is equipped with a curved screen, as opposed to the iPhone's flat display. And recently, it's been reported that Apple has ordered 70 million units of OLED panels from Samsung this year. It's also reported that the upcoming iPhone 8 will feature a 5.2-inch OLED screen with curved edges. This is an area that Apple has struggled with. Samsung's OLED offers brighter displays and better power efficiency over the liquid crystal displays currently in use on Apple's iPhones.

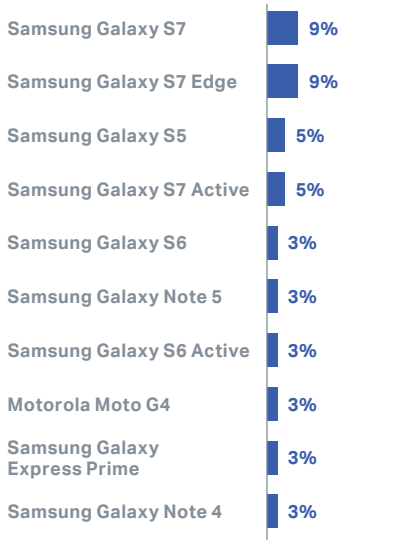
The two models also differentiate in design with the location of their home buttons – the home button on the Galaxy S8 is located on the back of the phone, as opposed to its front location on the iPhone 7. There have already been preliminary complaints about the location of the Galaxy S8's home button and fingerprint sensor, which sits right beside the rear camera so users end up smudging the lens every time the phone unlocks. Having the home button on the back of the phone is not more

Figure 2.

Top 10 Android Manufacturers by Failure Rate, Q1 2017



Top 10 Android Models by Failure Rate, Q1 2017



Note: The failure rates for Android manufacturers and models are taken as a percentage of the total Android failure rate (50 percent) in Q1 2017.

secure per se; it simply allows the user to have more screen and less of the "other" non-screen space. On the other hand, Apple with their next iPhone model is considering embedding it in the screen itself as a soft button, so there won't be a separate hardware button. Lastly, the two models differ in that the S8 contains facial recognition, something the iPhone 7 is missing.

While there are reasons to stick with the iPhone 7 over the Galaxy S8 and vice versa, the real competition will begin once the iPhone 8 releases in September. Given that it will be the model's tenth anniversary, we'll be curious to see how the two models stack up against each other.

Samsung, LGE and Motorola Perform Poorly Amidst Android Manufacturers, With Samsung Galaxy S7 and Samsung Galaxy S7 Edge Plagued by High Failure Rates

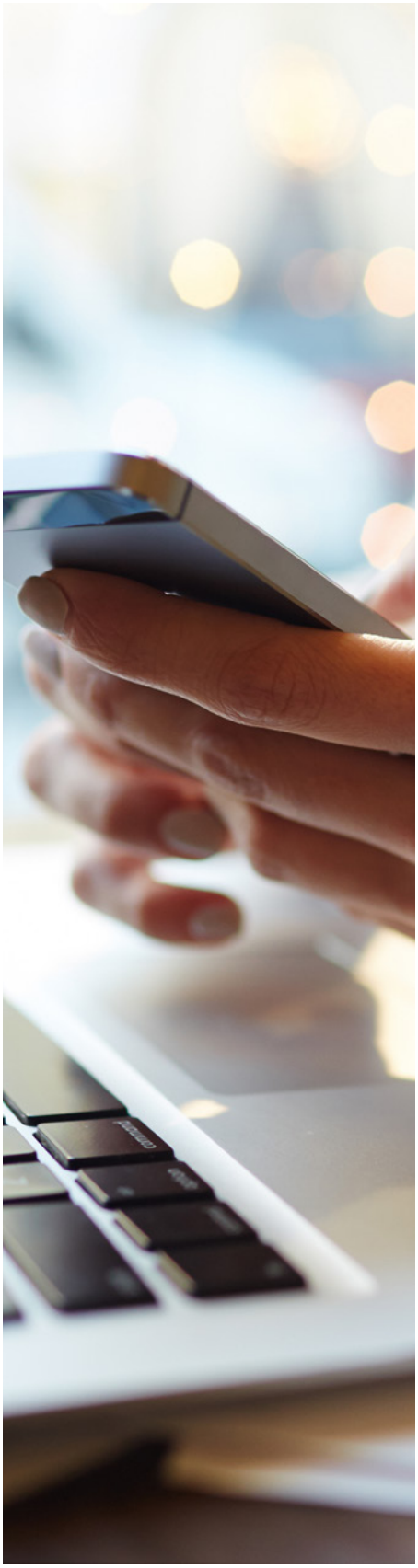
Similar to what we've seen in our previous quarterly trend reports, various Samsung smartphone models once again appeared on the list of top 10 Android devices with the highest failure rates. In Q1 2017, the Samsung Galaxy S7 ranked as the worst performing Android device with the highest failure rate (9 percent), followed by Samsung Galaxy S7 Edge (8 percent) and Samsung Galaxy S5 (5 percent).

There are various factors that could account for why multiple Samsung models had high failure rates in Q1 2017. One such explanation is that Samsung dominates the Android market with the highest market share, compared to other manufacturers such as LGE, Motorola, Huawei and others.

According to the International Data Corporation (IDC) Worldwide Quarterly Mobile Phone Tracker, Samsung shipped a total of 79.2 million smartphones worldwide in Q1 2017, giving it a 22.8 percent market share for the quarter. Although growth was flat (0 percent year-over-year), Samsung is still the leader in the worldwide smartphone market. This was due in part to substantial discounts offered for its Galaxy S7 and S7 Edge models, as the manufacturer made way for its new Galaxy S8 and S8+ models.

But outside of its high-end models, Samsung has also been shifting some of its focus to its lower-end models. One such model, the Galaxy Express Prime, appeared on our list of top Android models with the highest failure rates in Q1 2017. In particular, this model had a 3 percent failure rate. While that's not as high as some of the other models, such as the Galaxy S5 and Galaxy S6, it is still worthwhile to note.

In 2016, Samsung released the Galaxy Express Prime, a low-end phone that was among the first to offer Android 6.0 Marshmallow out of the box outside of the company's flagship line. The price point was considerably lower than other Samsung models, at $129.99. The Galaxy Express Prime features a 5-inch 720p Super AMOLED display, a quad-core Exynos 3475 processor, 1.5GB of RAM, a 5-megapixel rear camera, a 2-megapixel front camera, 16GB of internal storage, 4G LTE connectivity and a 2,600 mAh battery.



iPhone 7 and iPhone 7 Plus Are Two of the Worst Performing iPhone Models

When the iPhone 7 and iPhone 7 Plus launched in September 2016, tech bloggers and industry analysts pointed out the many differences between the iPhone 7 and iPhone 6. With the iPhone 7 Plus model, in particular, there was one particular feature that garnered significant buzz and attention by the press, industry analysts and the public – the dual-lens camera. It was seen as a major improvement from the 12-megapixel single lens on the iPhone 7.

According to Russ Ernst, Vice President of Product Management at Blancco Technology Group, "This new dual lens camera is a definite improvement to the overall image quality of photos taken and allows users to take better photos in low-light conditions. This is one area that Apple hasn't been as strong in previously, compared to Samsung devices that have been doing this for some time. I think this new feature will help Apple catch up to the superior camera functionality of Samsung devices."

Additionally, Apple made the decision to no longer offer a 16GB storage option for the iPhone 7. Most users take a large amount of photos and videos straight from their iPhones – and they're automatically uploaded to iCloud. Most iPhone 6 users with the 16GB version end up using almost all of their storage space relatively quickly due to the sheer number of apps they have installed on their devices. As Blancco VP of Product Management, Russ Ernst, explains, "Making 32GB the lowest storage option available has been a smart move given the sheer amount of media, apps and data users consume on their devices every day. That way, users won't have to worry if their device can fit all of the photos, videos, podcasts, apps and other information."

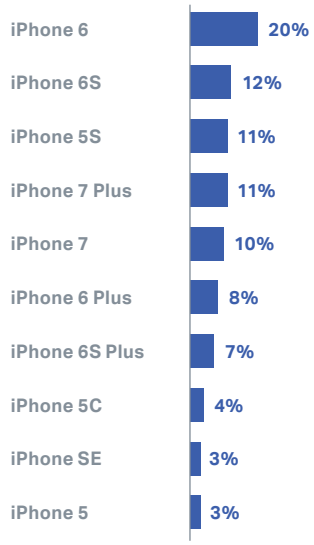
Ernst continues, "Despite this change, I don't anticipate it will lead to less reliance on cloud storage. If iPhone 6 users buy the new iPhone 7 with higher storage capacity, there is a good change they'll still use iCloud because they've grown to rely on it to back up their data. And there are so many new apps launched every day. So in another year, it's a definite possibility that 32GB might already be too small again in terms of storage capacity."

FEATURE	IPHONE 7	IPHONE 6
Design	138x67x7.1mm, 138g, IP67 cert.	138x67x6.9mm, 129g
Operating System	iOS 10	iOS 8
Processor	64-bit A10 chip (two 2.4GHz cores) 2GB of RAM	64-bit A8 chip, 1.4GHz dual core, 1GB of RAM
Display	4.7 in, 1334x750 resolution at 326ppi	4.7 in, 1334x750 resolution at 326ppi
Battery	1,960mAH	1,810mAH
Camera	12MP rear-facing, 7MP front-facing	8MP rear, 1.2MP front
Storage	32GB/128GB/256GB	16GB/64GB/128GB

Despite all of the new features and enhancements, the iPhone 7 and iPhone 7 Plus aren't doing as well as some analysts might have predicted in terms of performance. In the previous quarter (Q4 2016), our data revealed that the newer iPhone 7 and iPhone 7

Figure 3.

Top 10 iOS Models by Failure Rate, Q1 2017



Note: The failure rates for iOS models are taken as a percentage of the total iOS failure rate (68 percent) in Q1 2017.

Plus models failed at a rate of 3 percent and 3 percent, respectively. And these models had a significantly lower failure rate than other models, such as the iPhone 6 and iPhone 6S during that period.

Now the iPhone 7's failure rate has increased to 10 percent and the iPhone 7 Plus' failure rate has also increased to 11 percent in Q1 2017. This can be due in part to the fact that sales have increased for both of these new models over the course of the last few months. According to research from Kantar Worldpanel, Apple's new flagship iPhone 7 continues to gain in market share in several major countries. In fact, Kantar's data indicates that Apple's iPhone 7 was the best-selling smartphone in Q1 2017, with strong sales in both the U.S. and Europe markets.

It's also important to note that Apple released its iOS 10.2.1 software update in January 2017. According to the Apple website, this new update includes bug fixes and improves the security of iPhones and iPads. It also improves power management during peak workloads to avoid unexpected shutdowns on iPhone.

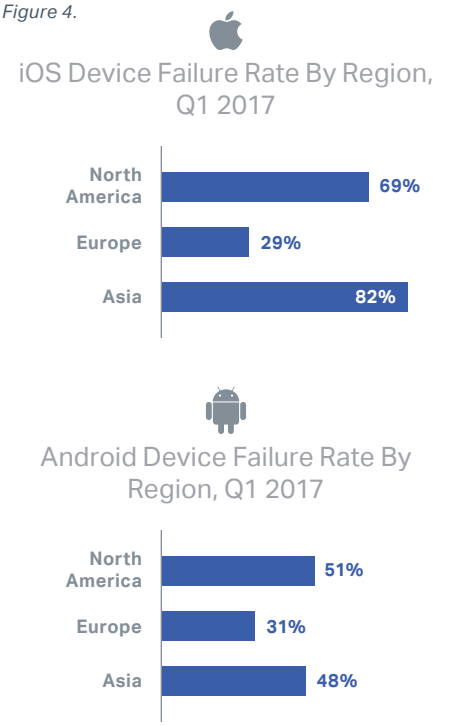
Two months later, Apple released its iOS 10.3 software update, which included some more significant enhancements compared to iOS 10.2. For example, the Find My iPhone app now includes an additional option to Find My Airpods. Additional features associated with the new software update include: 3D Touch support for Apple's weather app, Siri support for cricket scores from the ICC and Indian Premier League, a new Podcast widget that's similar to the one available for Apple's Music app and a new security section within the Apple ID Settings, to name a few.

Despite the fact that iOS 10.3 went through a lengthy BETA, users have reported a variety of issues with the new software update, including battery drain problems, WiFi and Bluetooth connectivity issues, random reboots and overall lag. This coincides with our diagnostics data, which found that WiFi was a common problem among iOS users in Q1 2017.

To remedy WiFi issues, users are advised to take the following actions:

- **Force restart the device.** To do this, press and hold the Sleep/Wake button until the red slider appears at the top of the screen. Then drag the slider to turn the device completely off. Wait for a few seconds and then restart the device.
- **Reset the network settings.** To do this, go to Settings>General>Reset>Reset Network Settings.
- **Forget and rejoin WiFi network.** To do this, go to Settings>Wi-Fi and enter the information page of the selected Wi-Fi network. Tap on Forget this Network and then rejoin the network again.
- **Turn off the location service for networking service.** To do this, go to Settings>Privacy>Location Services>System Services. This won't disable Wi-Fi entirely, but it will stop location service for Wi-Fi networking.
- **Restore the device.** If all of the above tips fail to solve your Wi-Fi problems, try restoring the device with iTunes. To do this, connect the iPhone to a computer and select Open iTunes. Then click the iPhone icon in the upper left corner of the iTunes window. Choose Summary and then click Restore iPhone.

Figure 4.



iPhone Failures Are Highest in Asia, While Android Users in North America Experience More Problems Than Other Geographic Regions

We've all heard the saying: "Location matters." This appears to be the case according to our mobile diagnostics data. In Q1 2017, iOS failures were highest in Asia (82 percent), compared to North America (69 percent) and Europe (29 percent). However, we saw a very different trend among Android users, where the failure rate was highest in North America (51 percent), followed by Asia (48 percent) and Europe (31 percent).

According to the most recent data from Kantar Worldpanel, Japan and Australia have the greatest demand for Apple devices, with almost half (49.5 percent) of the Japanese market being taken by Apple. Meanwhile, 42.4 percent of Australians are taken by the iOS devices. This could explain why the iOS failure rate was highest in Asia in Q1 2017.

Overheating and Trouble Connecting to GPS Are Common Issues for iPhone Users

Users rely on GPS to order ride-sharing services like Uber and Lyft. Users count on it to look up directions for wherever they may want to go – by walking, by car, by transport, etc. And millions of users have relied on GPS when playing Pokemon GO. Whatever the purpose, GPS is a useful and important component of the mobile experience.

But issues with GPS can be frustrating and counter-productive for users. As our data reveals, it's something that plagued iPhone users, in particular, in the first quarter of 2017. Specifically, connecting to GPS was one of the five most common performance issues on iOS devices worldwide, at a rate of 0.5 percent. While this percentage isn't necessarily high, it's worthwhile to note that it posed a bigger performance issue for iPhone users in North America (3 percent).

What could be causing these problems? For one, GPS can depend on network connectivity. So if a user has a poor signal or trouble connecting to WiFi, the GPS will perform poorly. Another reason users could be having trouble connecting to GPS on their iPhones is that the GPS is actually broken within the device.

Another reason users may have trouble connecting to GPS could be related to software updates released by Apple. Many iPhone 5, iPhone 6 and iPhone 6S users reported that their GPS wasn't working properly after they upgraded to the latest iOS software update. And there have been similar complaints among iPhone 7 users, who installed the iOS 10 update.

9 Recommended Tips to Fix GPS Issues on iPhones

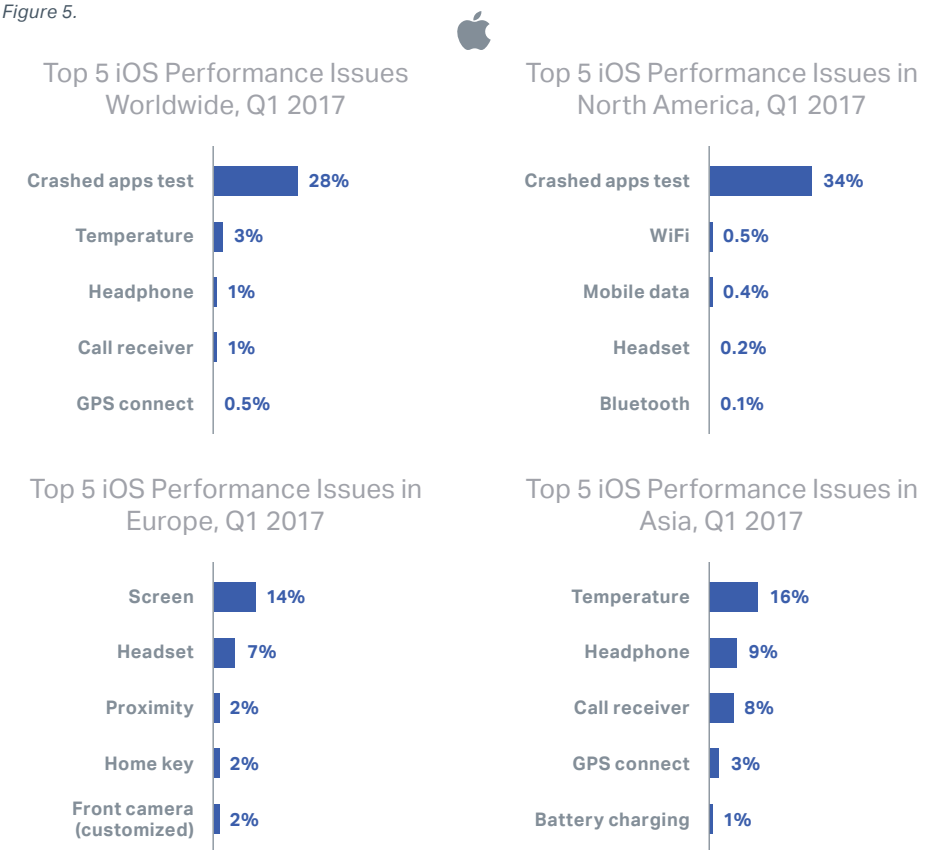
1. Make sure 'Location Services' are turned on for your device. You can find this under Settings > Privacy.
2. Turn on 'Airplane Mode' in Settings and then turn it off again.
3. Refresh Location Services on your iPhone by turning off and then turning it on.
4. Check out whether you have granted apps with location permission
5. Update the app(if you only face iPhone GPS issues when performing a specific app, you can try to fix by updating the app to the latest version).
6. Turn off LTE and choose 3G, in Settings > Cellular > Cellular Data Options > Voice and Data.
7. Select "Reset Network Settings" in Settings > General > Reset, enter your account and password if asked.
8. Check your network reception to see if weak signal strength is causing the GPS connection problem.
9. If the aforementioned tips don't work, visit your local Apple retail store or your mobile carrier's store to test your device and determine if the GPS is, in fact, broken.

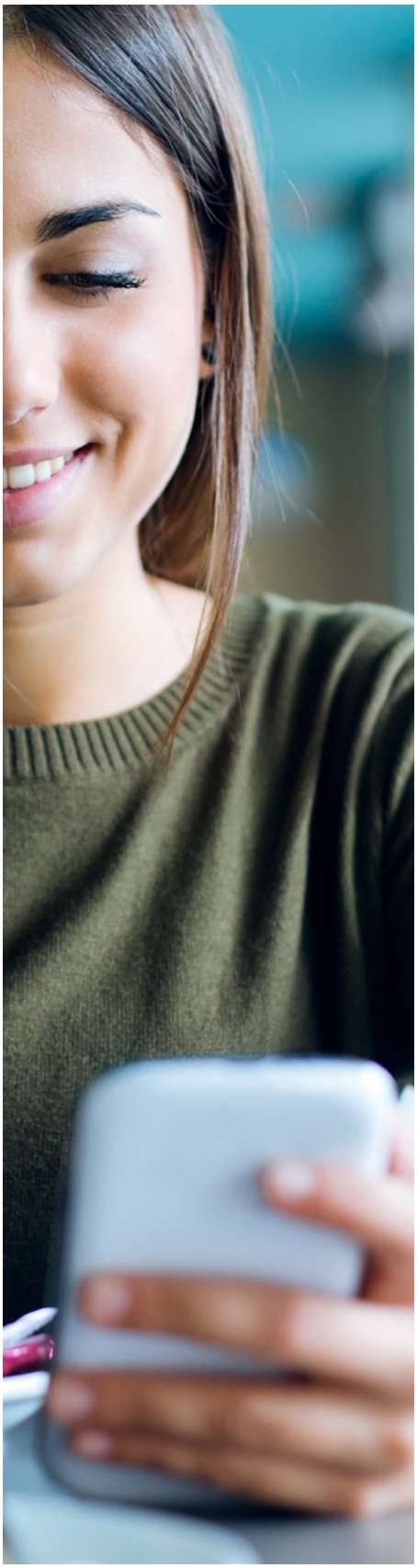
Key Trends & Insights

Another performance issue that popped up on iOS devices in Q1 2017, and has popped up in previous quarters, is related to temperature – that is, devices were overheating. Many users have experienced this problem one time or another. It could occur if the device has been in continuous use for hours and hours. It could also happen if you leave the phone in a confined, hot space, such as a car on a hot summer day for a long period of time. Playing games and using Bluetooth could also put unnecessary burdens on the device's operating system, causing it to overheat.

In March 2017, a report surfaced of an extreme case of an iPhone exploding. CCTV footage taken at a mobile repair shop in Australia showed an exchange between a device owner and the repair shop representative. When demonstrating the problem with his broken iPhone, the customer and his friend were shocked to see the device let off clouds of smoke, forcing him to throw it onto the counter. As reported by MacWorld, the shop's owner, Simon Owen, expressed his disbelief and said their "service counter has a giant hole in it."

Figure 5.





Camera Malfunctions and Weak Signal Strength Frustrate Android Users

According to our mobile diagnostics testing data, Android users experienced problems with their device's camera in Q1 2017. Given the Samsung Galaxy S7 was the worst performing Android model during this quarter, we decided to take a closer look at some camera malfunctions that have been reported by users of this specific model. In fact, there were reports from some Galaxy S7 users that the camera lens on the back was spontaneously breaking. This is clearly a hardware-related problem. If this occurs, Samsung Galaxy S7 users are advised to visit the nearest Samsung retail store or their mobile carrier to replace the faulty device.

Meanwhile, there have also been reports that Samsung Galaxy S7 Edge users were receiving the following notification – "Warning: Camera Failed" – after they installed the Android Nougat 7.1 update on their phones. It's important to remember that many services need to run in the background so the camera sensor can sync with the firmware and app – and take high-quality photos and videos. But sometimes, the hardware is unable to sync or fails to initialize altogether. When this happens, the camera could experience malfunctions.

Another common performance issue for Android users in Q1 2017 was related to the carrier signal (6 percent). As reported in Digital Trends, some Galaxy S6 owners have encountered problems with the carrier signal. In addition, this specific model's users have also had issues with poor battery life, WiFi failing to connect or dropping, inaccurate GPS and crashing apps.

Figure 6.

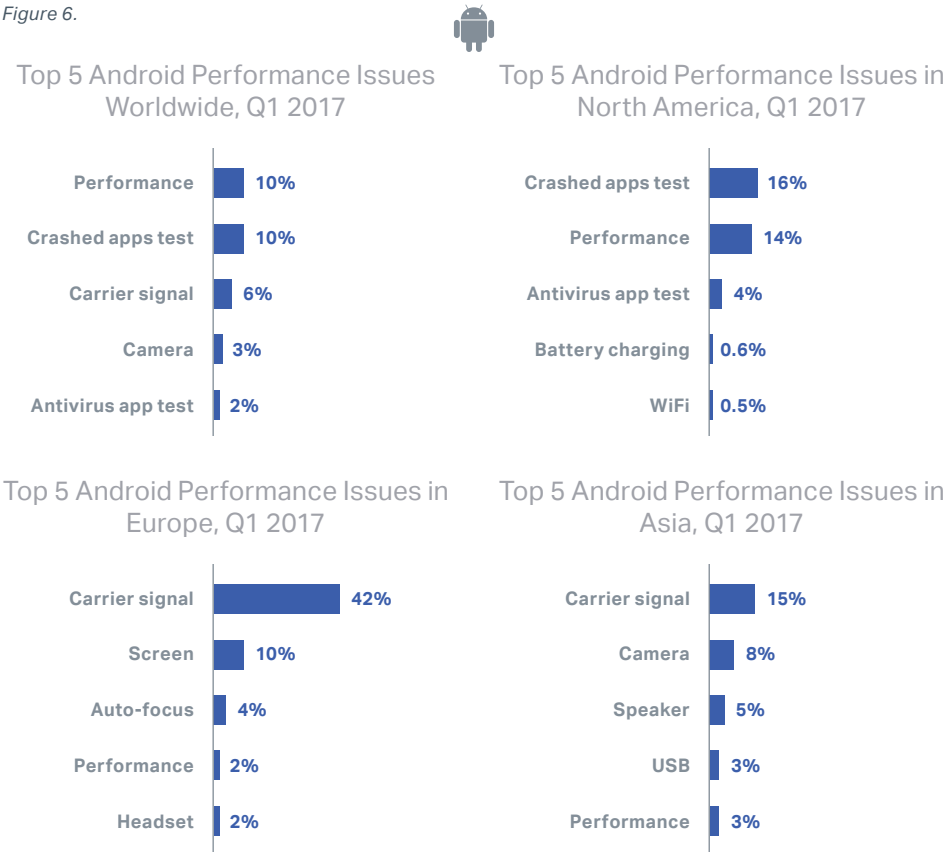


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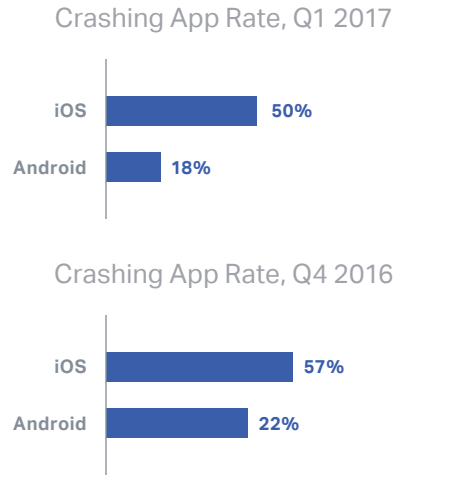
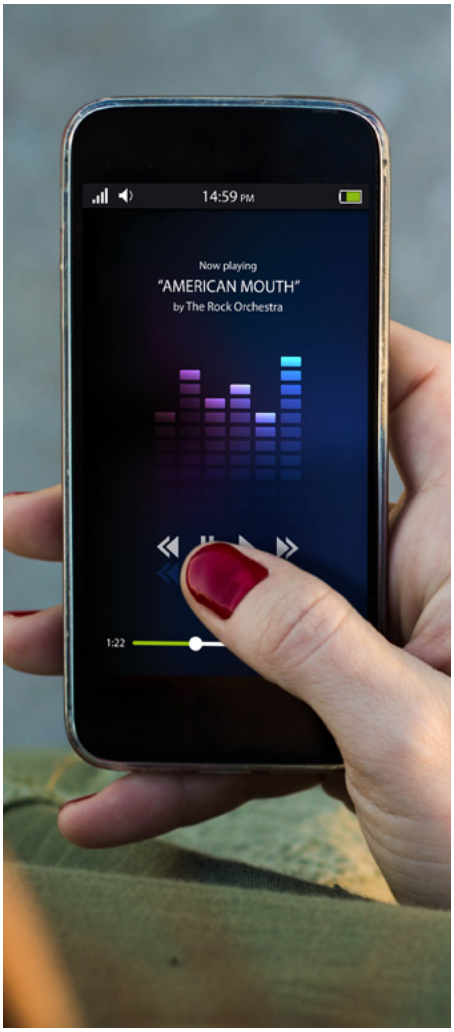
Figure 7.



Apps Crash Almost Three Times More on iPhones Than on Android Devices

According to our Q1 2017 mobile diagnostics data, crashing apps are a common occurrence on both iOS and Android devices. In fact, they crash almost three times more on iPhones (50 percent) than they do on Android devices (18 percent). Interestingly, the crashing app rate on iOS devices has decreased from 57 percent in Q4 2016 to 50 percent in Q1 2017. Meanwhile, the crashing app rate on Android devices has also gone down from 22 percent in Q4 2016 to 18 percent in Q1 2017.

This does not mean that the hardware and the device manufacturers are the ones to blame for this performance issue. As we've explained in our previous reports, there are several reasons for apps to crash. One such reason could be user behavior. Take, for example, a user who watches online videos, streams music and plays games repeatedly (for long periods of time) on a daily basis. This could eat into the device's performance and cause apps to crash. Another reason for crashing apps could be that a user hasn't updated the device to the latest operating system. And of course, a third cause could be related to the poor design of an app itself.



Pandora Music Streaming App Is New to List of Crashing iOS Apps, While YouTube and Google Apps Crash on Android Devices

Nowadays, there's an app for everything. That's certainly what the stats would support. In 2016, there was an increase in app downloads, time spent in apps and revenue generated from apps. According to App Annie, worldwide app downloads were up 15 percent year-over-year, while time spent in apps rose 25 percent.

Figure 8.

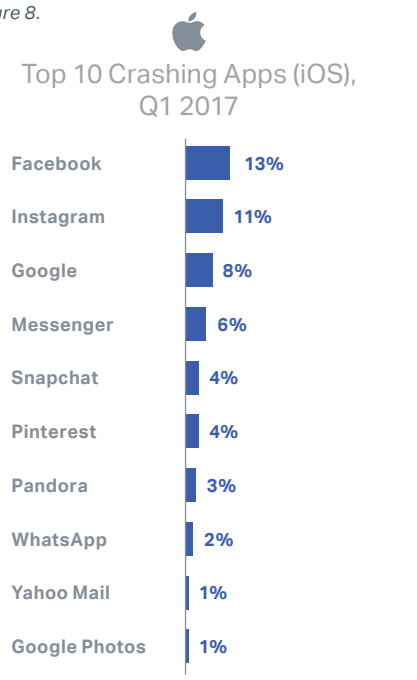
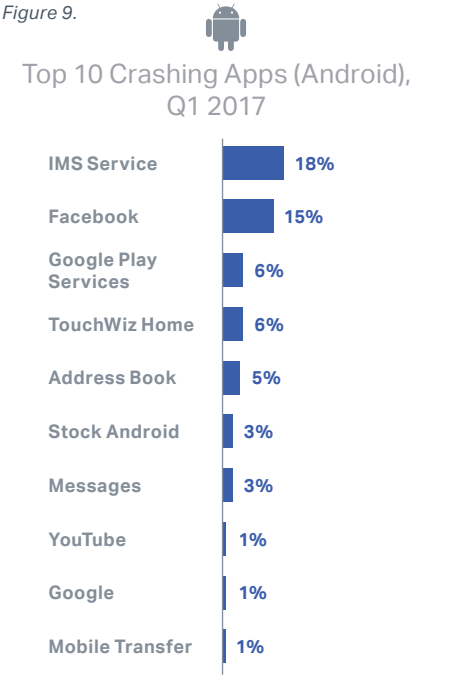


Figure 9.



But as app downloads and time spent in apps increase each quarter, it places a burden on devices and can cause apps to crash more frequently. Our Q1 2017 mobile diagnostics data found that the Facebook, Instagram and Snapchat apps had high crashing rates on iOS devices – at 13 percent, 11 percent and 4 percent, respectively. Given the popularity and frequency of use of these social media apps, it's not surprising they ranked in the top 10 list of crashing iOS apps in Q1 2017.

But one app that has not previously appeared on our list of top 10 crashing iOS apps is the Pandora app. However, this changed in Q1 2017 when the music streaming app crashed at a rate of 3 percent. This falls in line with several user complaints that the Pandora app has constantly crashed on iOS devices.

If this occurs, Pandora suggests two ways to resolve the problem. The first option is to reboot the device by shutting it down entirely. Then turn it back on and try using the Pandora app again. The second option is to uninstall and reinstall the app. To do this, users should hold down the Pandora icon on their screen until all the icons start shaking. Then tap the tiny "x" that appears in the upper left of the Pandora icon and confirm that you want to delete the app. Then re-install the Pandora app from the Apple App Store.

Since we began reporting on crashing apps, the Google Play Services app has repeatedly made it on the list of top 10 Android crashing apps. In Q1 2017, this app has once again appeared with a crashing rate of 6 percent. This is a slight increase from its crashing rate of 5 percent in the previous quarter (Q4 2016).

Meanwhile, this is the first time the YouTube app and the Google app have crashed on Android devices since we began reporting on device performance and health. In particular, the YouTube app had a crashing rate of 1 percent. There a few reasons the YouTube app could be crashing on Android devices. First, if the app is still running on an old version, this could cause it to crash. Second, a user's device could have a weak Internet connection and that could cause the app to crash. The app could also crash if users watch and upload videos regularly. Cleaning the app cache could help. Another source of the problem could be that the device is clogged up with too much data and apps and it needs to be cleaned up.

Conclusion

Through data collected from millions of iOS and Android devices brought into wireless carriers and device manufacturers for testing, we have learned that Android continues to hold its dominant position over Apple in both market share and device performance. Despite its leader position, our data indicates that various Samsung smartphone models, including the Galaxy S7 and Galaxy S7 Edge, were among the poorest performers compared to other Android manufacturers and models. Finally, our data also reveals that the iPhone 7 and iPhone 7 Plus, despite their new features and enhancements from previous models, were two of the worst performing iPhones in Q1 2017. There are implications from these findings for both mobile providers (device manufacturers and carriers) and enterprise organizations that increasingly allow BYOD use in the workplace.

For Manufacturers and Carriers

In today's highly competitive marketplace, mobile carriers and device manufacturers must deliver maximum value for their customers and improve the customer care experience across every channel. This has led to greater investments in staff training, education and technology – with the intent of keeping existing customers satisfied and loyal, boosting their Net Promoter Scores, reducing subscriber churn and increasing foot traffic and contract upsell opportunities. But the key to achieving these goals is being able to diagnose and repair device issues quickly, easily and accurately.

For Enterprise Organizations

More employees use their personal mobile devices inside and outside of the workplace than those who don't. Because of BYOD's increasing popularity among enterprise organizations, the IT and support desk teams have ultimately become the go-to 'fix it' source when employees' devices don't function properly. This creates a burden on IT and support desk workloads and manpower, which could be reduced significantly if employees understand how to optimize their own devices.

About the Technology Powering the Report

Through our Blancco Mobile Diagnostics solutions, we help some of the world's biggest and most iconic wireless carriers and device manufacturers automate and scale the diagnostics process across the entire mobile lifecycle and across every channel. To see how our Blancco Mobile Diagnostics solutions and business intelligence can help reduce the quantity and frequency of 'No Trouble Found' device returns, increase your Net Promoter Score and save millions of dollars each year, schedule a demo today.

About Blancco

Blancco is the de facto standard in data erasure and mobile device diagnostics. The Blancco Data Eraser solutions provide thousands of organizations with an absolute line of defense against costly security breaches, as well as verification of regulatory compliance through a 100% tamper-proof audit trail. Our data erasure solutions have been tested, certified, approved and recommended by 18 governing bodies around the world. No other security firm can boast this level of compliance with the most rigorous requirements set by government agencies, legal authorities and independent testing laboratories.

The Blancco Mobile Diagnostics solutions enable mobile network operators, retailers and insurers to easily, quickly and accurately identify and resolve performance issues on their customers' mobile devices. As a result, mobile service providers can spend less time dealing with technical issues and, in turn, reduce the quantity of NTF returns, save on operational costs and increase customer satisfaction.

For more information, visit our website at www.blancco.com.

Contact Us

For Marketing, Please Contact:
Email: marketing@blancco.com

For Corporate Communications & PR, Please Contact:
Email: press@blancco.com